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AMBLYOPIA FROM SUPPRESSION OF THE VISUAL IMAGE.¹

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At the last meeting of the American Ophthalmological Society, July, 1893, a case of "Suppression of the Visual Image" was reported in which the fixing eye which had normal vision was lost by accident. The squinting eye which was amblyopic with vision of fingers at 6" gradually resumed its functions, and nineteen days after the accident regained the normal acuity of vision.

The conclusions were, that in the case reported the amblyopia was not due to structural changes either in the eyeball or nerve centers but to continued suppression of the visual image induced by convergence of the visual lines probably induced by an hypermetropia. The case here reported is another evidence of the existence of amblyopia exanopsia and clearly

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presented by the author



indicates that the amblyopic eye does not enter into the visual act even though the eye may be successfully operated upon, and that although it does not resume its functions while the fellow eye is still selected for use, it has the ability to, and does return to its normal condition immediately after the loss or destruction of the fixing eye. The confusion of images, caused by the mental impression of sight in the formerly fixing but now cataractous eye in the case reported, indicates the persistence of mental impressions and explains why continued closure of a fixing eye in strabismus cases does not result in any material improvement in the vision of the amblyopic eye, the mental impression of the ability to see with the covered eye preventing the amblyopic eye from assuming the function of sight.

The fixing eye being almost invariably chosen to continue the visual act, the squinting eye not only has no stimulus to increase its power of vision but is deterred from resuming visual acuteness by the cerebral centers even if the visual lines have been paralleled by operation, because of the confusion of images accompanying any effort at vision.

The cerebral centers having lost the conscious activity of the visual functions from continued suppression, generally remain in that condition in preference to re-establishing binocular fixation with its attendant confusion and discomfort.

The persistence of the hypersensitiveness of the eccentric portion of the visual field in this case, even after the partial central scotoma had disappeared and central vision had practically returned, is indicated by the peculiar brightness and distinctness around the point of central fixation and by the decreasing mental confusion in locating objects and lack of confidence in walking until normal projection was finally established.

The difficulty of a return of normal vision in an amblyopic eye, which is apparent, and in the two cases reported, only occurred after loss of, or loss of sight in, the fixing eye and which in the case here presented was not influenced by a tenotomy, would seem to indicate that amblyopia is, in a large propor-

tion of squinting eyes, an acquired condition resulting from squint and but rarely a disease which is an etiological factor in the production of squint.

The etiology of acquired amblyopia can be logically demonstrated if it is admitted that hypermetropia produces a constant tension of accommodation necessitating an increased convergence of the visual lines, and that the deviation from the normal axis of vision thus produced causes confusion of images and subsequently diplopia.

The natural tendency of the visual centers is to relieve themselves of this diplopia which is an offending condition and relief is attained by a gradual loss of physiological sensibility through psychical exclusion of the vision of one of the eyes. The selected eye may or may not have diminished visual acuteness due to a greater refractive error than the fellow eye, each eye, however, generally having an hypermetropia of a greater or lesser degree which is almost always present and is undoubtedly an important etiological factor in the production of convergent squint.

The importance of hypermetropia as a factor in producing squint is illustrated in the correction of refractive errors by properly adjusted glasses after operations for tenotomy; the relief of the tension of accommodation assisting in maintaining the parallelism of the eyes by removing the cause of the previous convergence, the eyes frequently appearing to be on a perfectly parallel plane with the glasses in position, and decidedly converged when the glasses are temporarily discarded.

The conscious activity of the visual functions of each eye is maintained and the condition of visual suppression does not generally occur as long as the eyes converge only periodically, or even when the convergence is of the alternating variety; but when constant convergence of one or the other eye is present the mental process of suppression may occur rapidly to an extent sufficient to prevent confusion of images and may subsequently become so excessive that the amblyopia will render the eye practically blind in consequence of the continued condition which favors a desire to mentally abstract the

power of vision. The facts presented indicate the desirability not only of early operation in all cases of convergent squint before the amblyopic condition is fully established but also the adjustment of correcting lenses which relieve the tension of the accommodation and should be used in all cases of convergence whether an operation for tenotomy of the recti muscles is resorted to or not.

J. F., aged thirty, a strong, healthy man, applied for treatment at the Paterson Eye and Ear Infirmary. When a child he had a convergence of the right eye which persisted until he was about seventeen or eighteen years of age; at that time he was operated by Dr. Althoff at the New York Eye and Ear Infirmary; he was not fitted with glasses. He did not consider the operation perfectly successful, as his eye would turn in at times, especially when he became at all nervous or self-conscious.

He was not aware that there was any difference in the vision of his eyes until about one year ago when he called upon an optician for the purpose of selecting glasses for use in reading, in consequence of a scratching, burning and heaviness of the lids which troubled him at night.

He then discovered that he could not see to read as well with the right as he could with the left eye, and that a glass made no improvement in the vision of the right eye either for near or distance; his left eye he thinks was slightly improved both at distance and near by $+1/32$ which he bought at that time and has since used in reading at nights. August 28, 1893. While working at his trade as a machinist he was struck in the left eye by a flying piece of wrought iron chipping about one-half inch by three-fourths of an inch in size. He immediately applied for treatment. Examination disclosed a wound of the cornea about 3''' in length in the infra-nasal quadrant with the iris prolapsed.

There was an appearance indicating the presence of some particles of iron adherent to the wound which was probably due to pigmentation from the iris as it could not be removed by the magnet and subsequently disappeared.

The cornea was stroked until the iris receded, although a portion midway between the pupillary margin and the limbus still remained in contact with the corneal wound, the anterior chamber being empty.

The vision of the right eye was then tested and found to be $\frac{20}{LXX}$, no improvement with glasses.

The patient was then sent to the hospital, cold applications were used continuously, and one drop of a solution of sulphate of eserine, one-half grain to the ounce, was dropped into the eye three times a day. September 1. The injured eye has made extremely satisfactory progress, the corneal wound having closed, the anterior chamber being re-established, a slight anterior synechia only being present, the patient has suffered but little pain, ophthalmoscopic examination, however, disclosed a traumatic opacity of the lens, the pupil is slightly irregular and there is some circumcorneal injection. Left eye, V.=fingers at 1'.

On this date, only four days after the injury, the right eye, on examination, shows R. E., V.= $\frac{20}{XX}$; $\frac{20}{XX}$ w. $+\frac{1}{24}$.

Ophthalmoscopic examination is negative, no lesion being discovered and the fundus appearing perfectly normal.

September 4, one week after the injury, the vision is still further improved.

R. E., V.= $\frac{20}{XX}$; $\frac{20}{XV}$ — w. $+\frac{1}{24}$.

September 9. His vision is still improving, on this date, for the first time he is able to read large print at the near point.

R. E., V.= $\frac{20}{XV}$; $\frac{20}{X}$ — w. $+\frac{1}{24}$.

September 12, fifteen days after the injury, the eye used singly had normal vision, the patient was able to read.

Jæger No. 1 at ten inches.

R. E., V.= $\frac{20}{XV}$; $\frac{20}{X}$ — w. $+\frac{1}{24}$.

L. E., V.=Fingers at 4'.

September 21. He has experienced great difficulty in accurately locating objects and has a constant lack of confidence in walking which is decidedly improved since the glass over the left eye was blackened three days previous to present visit.

Although he can only see to count fingers at four feet with the left eye, he complains that unless it is covered it interferes with his vision for near or distance, producing a blurring of objects, probably due to a cerebral impression that the left eye is about to engage in the visual act. He states that he feels now as he used to with the other eye before the injury, as though he could do better with one eye closed. When reading with both eyes open and without glasses he has great difficulty in separating and locating objects and a feeling of confusion and blurring rapidly supervenes. In distant vision he describes a peculiar brightness and distinctness around the line of letters on all sides.

October 4. R. E., $V.=^{20}/_x$ w. $+ 1/24$.

L. E., $V.=$ fingers at 6'.

The vision in the left eye is improved in consequence of the absorption of some of the softened cortex of the lens, the patient finds that he is still unable to dispense with the black glass over the left eye without great confusion, especially when out of doors, although he frequently does not wear the glasses in the house.

November 18. The patient tested with both eyes open and without glasses. $V.=^{20}/_{xv}$ —.

With the left eye closed and without glasses there was but slight difference in the vision although the patient was much more comfortable. $V.=^{20}/_{xv}$.

With both eyes open and glasses $+ 1/24$ over each. $V.=^{20}/_{xv}$ —.

With the left eye closed and a glass $+ 1/24$ over the right eye. $V.=^{20}/_x$ w. $+ 1/24$.

The vision in the left eye was fingers at 6', he still wears the glass over the eye blackened when reading and for distances, when walking or cycle-riding. In all the tests of vision the Snellen test type was used, the patient, however, being placed only fifteen feet from the card, although twenty has been used throughout as a numerator of the fraction.



